

National Academy of Sciences of Ukraine  
Institute of Mathematics

## Bogolyubov Kyiv Conference

### **Problems of Theoretical and Mathematical Physics**

dedicated to the 115th anniversary of M.M. Bogolyubov (1909–1992)

September 24–26, 2024

Kyiv, Ukraine

## **Program**

### Section 5 Mathematics

Kyiv 2024

## Links for meetings

### **Bogolyubov Institute for Theoretical Physics**

[Stream of Sections 1-4](#)

[Program of sections 1-4, Poster Session of sections 1-4](#)

### **Institute of Mathematics Section 5**

The meeting of the 5th section 5 will be held in a mixed format:

**offline** (at the Institute of Mathematics) and **online**

Zoom Meeting

<https://us02web.zoom.us/j/82179648021?pwd=jDHJr9KUCVhcYpXpmg64fSXw78RuRB.1>

Meeting ID: 821 7964 8021

Passcode: 364645

## Tuesday, September 24

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**9:00** Registration

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**10:00** Conference opening (online translation from BITP)

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### MORNING SESSION

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**Chairperson:** Maryna Nesterenko

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**10:20** (30 min) **Oleksii Rebenko** “Virial expansions for correlation functions in canonical ensemble” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**10:50** (30 min) **Dmytro Shepelsky** “Periodic problem for the nonlinear Schrödinger equation by the Riemann–Hilbert approach” *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine* [Abstract](#)

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**11:20** (30 min) **Vitaliy Vasylyk, Volodymyr Makarov** “Exponentially convergent method for inhomogeneous differential equation with Weyl derivative and unbounded operator coefficient in Banach space” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**11:50** COFFEE BREAK

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**Chairperson:** Oleksii Rebenko

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**12:30** (30 min) **Roman Popovych** “Discrete symmetries of differential equations” *Silesian University of Opava and Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**13:00** (20 min) **Serhii Koval** “Extended symmetry analysis of (1+2)-dimensional fine Kolmogorov backward equation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**13:20** (30 min) **Sergey Chuiko** “Approximation of the solutions of nonlinear matrix equations using the Newton–Kantorovich method” *Donbass state pedagogical university* [Abstract](#)

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**13:50** LUNCH

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## AFTERNOON SESSION

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**Chairperson:** Vyacheslav Boyko

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- 14:30** (20 min) **Sergiy Gefter, Aleksey Piven'** “Representations of solutions of some nonlinear PDEs in the form of series in powers of the  $\delta$ -function” *V.N. Karazin Kharkiv National University* [Abstract](#)
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- 14:50** (20 min) **Oleksiy Shcherbyna** “Dissipative magnetic 2D Zakharov system in bounded domain” *V.N. Karazin Kharkiv National University* [Abstract](#)
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- 15:10** (20 min) **Oleg Kolomiichuk** “Identification of unknown parameters of a fully controlled noisy gyroscopic system” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
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- 15:30** (20 min) **Dmytro Popovych** “Generalized symmetries of Burgers equation” *Institute of Mathematics of NAS of Ukraine and Memorial University of Newfoundland* [Abstract](#)
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- 15:50** (20 min) **Iryna Yehorchenko** “Systems of Eikonal equations – construction of general solutions” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
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- 16:10** (20 min) **Kostyantyn Sirenko, Anatoliy Poyedinchuk, Nataliya Yashina, Petr Melezhik** “Spectral theory approach to the analysis of diffraction radiation generated on a metal-backed graphene layer with periodic interface” *O.Ya. Usikov Institute for Radiophysics and Electronics, NAS of Ukraine* [Abstract](#)
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## Wednesday, September 25

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### MORNING SESSION

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**Chairperson:** Vitaliy Vasylyk

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**10:00** (30 min) **Alexander Timokha, Anton Miliiaiev** “Hidden physics models in sloshing: machine learning of multimodal equations” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**10:30** (30 min) **Viktor Gerasimenko** “About the works of M. Bogolyubov at the Institute of Mathematics” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**11:00** (30 min) **Volodymyr Koshmanenko, Oksana Satur** “On structure of the point spectrum in equilibrium states of the dynamical conflict systems” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**11:30** (30 min) **Volodymyr Makarov, Natalya Mayko, Vyacheslav Ryabichev** “The properties of some new polynomials in the problem with the fractional derivative” *Institute of Mathematics of NAS of Ukraine and Taras Shevchenko National University of Kyiv* [Abstract](#)

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**12:00** COFFEE BREAK

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**Chairperson:** Maryna Nesterenko

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**12:30** (30 min) **Arthemy Kiselev** “New identities for differential-polynomial structures built from Jacobian determinants” *University of Groningen* [Abstract](#)

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**13:00** (20 min) **Mollie Susan Jagoe Brown** “Kontsevich graph  $\gamma_3$ -flow of Nambu-Poisson brackets: triviality established in 2D, 3D, and now, in 4D” *University of Groningen* [Abstract](#)

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**13:20** (30 min) **Oleksandr Burylko** “Reversible saddle-node separatrix-loop bifurcation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**13:50** LUNCH

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## AFTERNOON SESSION

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**Chairperson:** Vyacheslav Boyko

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- 14:30**  
(20 min) **Olga Nesmelova, Peter Benner, Sergey Chuiko** “Adomian decomposition method for nonlinear boundary-value problems unsolved with respect to the derivative in the critical case” *Institute of Applied Mathematics and Mechanics of NAS of Ukraine; Max Planck Institute for Dynamics of Complex Technical Systems; Donbass state pedagogical university* [Abstract](#)
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- 14:50**  
(20 min) **Kostyantyn Sirenko, Maksym Maiboroda and Vadym Pazynin, Wilhelm Keusgen** “Optimization of parameters of input pulses for passive photonic-crystal-based electromagnetic energy compressors” *O.Ya. Usikov Institute for Radiophysics and Electronics, NAS of Ukraine and Technical University of Berlin* [Abstract](#)
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- 15:10**  
(20 min) **Andriy Nazarenko, Anton Nazarenko** “Towards the study of quantum properties of the Borromean rings complement in the Poincaré ball” *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine and KAU, Institute of mathematics of NAS of Ukraine* [Abstract](#)
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- 15:30**  
(20 min) **Sergii Golubev** “Asymptotic behaviour of solutions of the differential equation of the form  $y^{(4)} = \alpha_0 p(t) \varphi(y)$  with rapidly varying nonlinearity in the case of  $\lambda_0 = 1$ ” *Odesa I.I. Mechnikov National University* [Abstract](#)
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- 15:50**  
(20 min) **Yan Rybalko** “Well-posedness of the Cauchy problem for the two-component peakon system” *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine* [Abstract](#)
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- 16:10**  
(20 min) **Ihor Sokolenko, Anatolii Serdyuk** “Approximation by interpolation trigonometric polynomials in Weyl-Nagy classes  $W^r_{\{\beta,1\}}$ ” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
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## Thursday, September 26

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### MORNING SESSION

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**Chairperson:** Vyacheslav Boyko

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**10:00** (30 min) **Anatoly Nikitin** “Integrable and superintegrable quantum mechanical systems with position dependent masses invariant with respect to one-parametric Lie groups” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**10:30** (30 min) **Volodymyr Rybalko and Antonina Rybalko** “Asymptotic analysis of spectral problems for nonlocal operators” *B. Verkin Institute for Low Temperature Physics; Engineering of NAS of Ukraine, Chalmers University of Technology; Gothenburg University and Kharkiv National University of Radio Electronics* [Abstract](#)

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**11:00** (30 min) **Valerii Samoilenko** “Asymptotic step-like solutions of the Burgers equation with variable coefficients and singular perturbation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**11:30** (30 min) **Yuliia Samoilenko** “Soliton- and peakon-like solutions to the modified Camassa-Holm equation with variable coefficients” *Claude Bernard University Lyon 1* [Abstract](#)

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**12:00** COFFEE BREAK

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**Chairperson:** Anatoly Nikitin

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**12:30** (30 min) **Nikolai Iorgov** “Painlevé I equation and modular forms” *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine* [Abstract](#)

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**13:00** (20 min) **Yurii Zhuravlov** “The Painlevé I equation and Virasoro algebra” *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine* [Abstract](#)

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**13:20** (30 min) **Vyacheslav Boyko** “On Lie symmetries of linear systems of second-order ordinary differential equations” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**13:50** LUNCH

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## AFTERNOON SESSION

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**Chairperson:** Vyacheslav Boyko

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**14:30**  
(30 min)      **Larissa Fardigola** “On controllability problems for the heat equation controlled by the Dirichlet boundary condition” *B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine*  
[Abstract](#)

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**15:00**  
(20 min)      **Oleksandra Vinnichenko** “Geometric properties and exact solutions of dispersionless Nizhnik equation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**15:20**  
(20 min)      **Igor Gapyak** “Non-perturbative solutions of BBGKY hierarchy of evolution equations for colliding particles” *Taras Shevchenko National University of Kyiv; Institute of Mathematics of NAS of Ukraine*  
[Abstract](#)

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**15:40**  
(20 min)      **Iryna Denega** “Extremal decomposition problem for points on an arbitrary ellipse” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

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**16:00**  
(20 min)      **Iryna Raievska, Maryna Raievska** “Local nearrings and GAP” *University of Warsaw and Institute of Mathematics of NAS of Ukraine*  
[Abstract](#)

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**16:20**  
(20 min)

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**16:50**      **Closing of the conference**

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## Poster session

(Tuesday, September 24)

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**Sergey Chuiko, Viktor Chuiko** “Adomian decomposition method in the theory of nonlinear boundary value problems with delay in the critical case” *Donbass state pedagogical university* [Abstract](#), [Poster](#)

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**Daria Dyachenko, Sergey Chuiko** “Autonomous boundary-value problem unsolved with respect to the derivative in the critical case” *Donbass state pedagogical university* [Abstract](#), [Poster](#)

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**Oksana Hentosh** “Two-dimensional central extensions of some superconformal loop Lie algebra generalization and compatibly bi-Hamiltonian  $(2N+1)$ -dimensional systems on functional supermanifolds” *Pidstryhach Institute for Applied Problems of Mechanics and Mathematics of NAS of Ukraine* [Abstract](#)

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**Oleksii Hukalov, Vyacheslav Gordevskyy** “The some solution of the Boltzmann equation” *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine; V. N. Karazin Kharkiv National University* [Abstract](#), [Poster](#)

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**Tetiana Karataieva, Volodymyr Koshmanenko** “A model of a conflict society with separate support for individual clusters” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

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**Maryna Nesterenko** “Quasicrystals in data coding” *Institute of mathematics of NAS of Ukraine and National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”* [Abstract](#), [Poster](#)

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**Petro Samusenko** “Asymptotic solutions of boundary value problem for singularly perturbed differential algebraic equations” *National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”* [Abstract](#), [Poster](#)

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**Serhii Solodky, Yevgeniya Semenova** “Application of Chebyshev polynomials for optimal differentiation and summation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

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**Mykola Staryi** “On modern applications of Lie algebras” *KAU, Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

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**Alisa Tsukanova** “Solving classical systems of linear equations with the help of non-classical gradient and classical algebraic methods” *National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”* [Abstract](#), [Poster](#)

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**Halyna Tuluchenko** “Fitting of the cumulative function for a distribution of statistic from the one-sample Anderson-Darling test” *National Technical University “Kharkiv Polytechnic Institute”* [Abstract](#)

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**Olena Vaneeva, Oksana Brahinets, Olena Magda, Alexander Zhelij** “Equivalence method for the construction of exact solutions of generalized Korteweg-de Vries equations” *Institute of Mathematics of NAS of Ukraine, Petro Mohyla Black Sea National University, National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute* [Abstract](#), [Poster](#)

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